

LA150 Documentation of Cross Sections, Heating, and Damage: Part A (Incident Neutrons) and Part B (Incident Protons)¹

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Abstract

This Report contains summary information and figures depicting the Los Alamos ENDF evaluations that extend up to 150 MeV (the "LA150 Library"), developed for enhanced computational simulations of Accelerator-Driven Systems [1].

Information is included here for the following isotopes and elements important in radiation transport simulations of Accelerator-Driven Systems: ^{1,2}H, C, ¹⁴N, ¹⁶O, ²⁷Al, ^{28,29,30}Si, ³¹P, Ca, ^{50,52,53,54}Cr, ^{54,56,57}Fe, ^{58,60,61,62,64}Ni, ^{63,63}Cu ⁹³Nb ^{182,183,184,186}W, ^{206,207,208}Pb. For each material we include:

1. Summary documentation from the ENDF file-1.
2. A summary printout of the total nonelastic, elastic, and production cross sections of light ejectiles, and the partial and total neutron kerma coefficients for neutron heating.
3. Figures showing: (1) the incident-energy-dependence of the nonelastic cross section and the production cross sections; (2) a 3-D representation of the light ejectile angle-integrated c.m. emission spectra; (3) a 3-D representation of the light ejectile Kalbach-preequilibrium-ratios (from which angular distributions can be determined); (4) elastic scattering angular distributions; (5) heating; (6) damage (for incident neutrons).

The figures, in particular, allow one to quickly assess trends in the evaluated data, and to ensure the absence of numerical errors in the ENDF-files. All the information was obtained in an automated manner from the LA150 evaluations. Much of this information is also available on the WWW at: <http://t2.lanl.gov/data/he.html>

This work, which focusses solely on the evaluated data, complements Ref. [1] which focusses on the physics involved, together with benchmark comparisons with experimental data.

[1] M.B. Chadwick, P.G. Young, S. Chiba, S.C. Frankle, G.M. Hale, H.G. Hughes, A.J. Koning, R.C. Little, R.E. MacFarlane, R.E. Prael, L.S. Waters, "Cross Section Evaluations to 150 MeV for Accelerator-Drive Systems and Implementation in MCNPX", Los Alamos Report LA-UR-98-1825, Nucl. Sci. Eng. **131**, 293 - 328 (1999).

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